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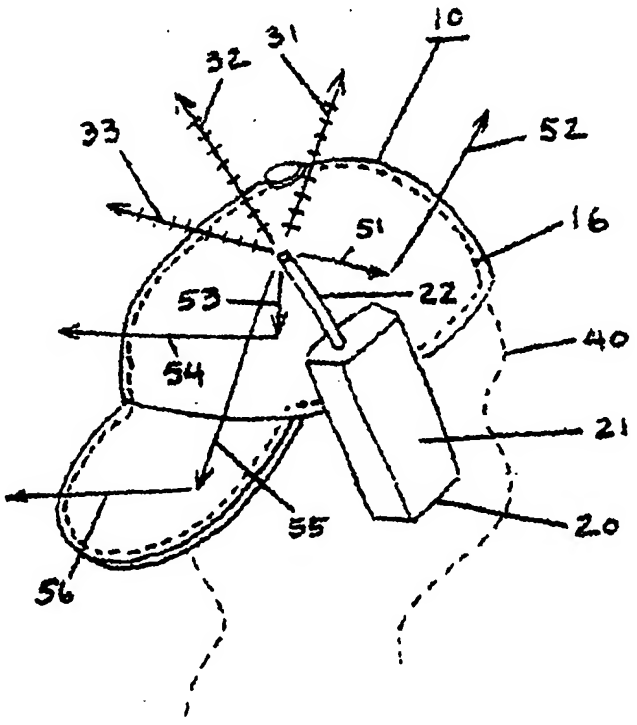
(54) Title: DEVICE FOR RADIATION SHIELDING OF WIRELESS TRANSMIT/RECEIVE ELECTRONIC EQUIPMENT



(57) Abstract: A device for locally shielding or blocking a user from close proximity electromagnetic fields 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71 emitted by a wireless electronic equipment antenna 22 such as a cellular telephone. The device includes a wearable garments such as a baseball cap 10, electronic carrying pouch 110, fan 210, 250, 410, eyeglass 610 design, or screens, joined with having EMI/RFI material properties that is specifically worn by or placed between the user and the electromagnetic field source 22. It serves to provide as an electromagnetic field shield, either reflective, absorptive, or dissipative behavior in nature, from a direct line-of-sight electromagnetic field 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71 radiating from a wireless device antenna 22.

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Device For Radiation Shielding of Wireless Transmit / Receive Electronic Equipment

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates generally to shielding electromagnetic interference / radio frequency interference (EMI / RFI) fields and, more particularly, to shielding sensitive local human body tissue parts from potential harmful electromagnetic fields emanating from close proximity direct line-of-sight wireless transmit / receive electronic equipment antenna source.

Background Art

There is much concern throughout the world that electromagnetic field radiation and microwave radiation may cause human body tissue damage. The antenna and the body of wireless transmit / receive electronic equipment such as a cellular telephone and higher frequency band transceivers come in close contact with a person head or sensitive human body tissue part thereby creating a close exposure to electromagnetic field and microwave radiation. Because of these hazards and to offer some protection against these hazards, some form of shielding devices was invented. Current state-of-the-art provide accessories for cellular telephones or higher frequency band transceivers that will afford some protection to cellular telephone and higher

frequency band transceiver users from the alleged brain, head and sensitive body tissue damage caused by electromagnetic field radiation of cellular telephone or higher frequency band transceiver use. These accessories are primarily of closed-form design solutions around the electronic equipment to reduce electromagnetic field radiation emanating from the electronic equipment body, but does not attempt to sufficiently reduce electromagnetic field radiation from the antenna, regarding direct line-of-sight signal transmission between the antenna and the sensitive human body tissue part without causing serious impact to normal signal transmission operation.

Some attempts to implement closed-form method shielding design solutions around electromagnetic field radiation from an electronic equipment antenna would be very difficult to implement without causing tremendous antenna transmit / receive signal degradation for the equipment and still be effective in providing sufficiently adequate shielding for the user. Strict and exacting design parameters and controls over time of equipment operation on shield spacing, positioning, shield part dimensions and material electrical characteristic behavior parameters under normal stress movement conditions by the user, would be required to solve the complex and specific antenna electromagnetic field frequency response voltage standing wave ratio loading and matching criteria relative to that particular antenna electrical structure design in order for proper antenna operation.

Note that for added clarification regarding the concept of closed-form method design solutions, a simplified circuit model is shown in Figure A, that shows a comparison between the closed-form versus opened-form method design solutions as applied to close-proximity electromagnetic field radiation exposure to the user. Also note that the basic distinction for the closed-form method design solutions is for the shielding to encompass around the electronic equipment body or antenna as noted by

the diagrammed reference node point to antenna. But with regards to the opened-form method design solution, is the shielding to encompass around the human body user part as noted by the diagrammed reference node point to user. Further note, if we were to start with the same finite small closed-form and opened-form surface shielding area and now increase each surface area evenly further, the closed-form shielding area encompasses and terminates more electromagnetic fields from the antenna thereby increasing the design sensitivities and interactions, whereas for the opened-form shielding area does not encompass or terminate electromagnetic fields appreciably to affect the antenna operation any further for matters that would be appreciated by those skilled in the art.

What is needed is an opened-form method design solution that is simply detached from the design requirement of solving for complex antenna matching criteria parameters and now centered the design solution around the exposed electronic user body part, serving means to provide an electromagnetic field radiation shielding or blockage, either reflective or absorptive or dissipative behavior in nature, in order to reduce the direct line-of-sight antenna electromagnetic field radiation to the sensitive human body tissue part without causing significant antenna signal transmit / receive degradation for proper wireless electronic equipment operation and simplifying the shielding device design, irrespective of any antenna strict electrical and structure matching criteria that would be imposed if one were to use parameters for closed-form method design solutions, thus simplifying the present invention fabrication, improving performance reliability and repeatability of the present invention.

SUMMARY OF THE INVENTION

In accordance with the teaching of the present invention, a shielding device using opened-form method design solutions around the electronic user body part, that will reduce potential harmful effects from the direct line-of-sight electromagnetic field radiation of an emanating antenna source of a wireless transmit / receive electronic equipment including such as and not limited to a cellular telephone is disclosed that employs the use of wearable garments including and not limited to a hat, eyewear articles, wearable wrap-around type articles, electronic equipment carrying pouch of upwardly fan structure arrangement, foldable or fixed fan structure arrangement, internally pop-up fan mechanism arrangement, screen structure arrangement, that resolves the problem of inadequate antenna electromagnetic field direct line-of-sight human body part shielding protection as stated in the prior art discussion.

The electromagnetic field radiation shielding device is comprised of a wearable garments including a hat, eyewear articles, wearable wrap-around type articles, electronic equipment carrying pouch of upwardly fan structure arrangement, foldable or fixed fan structure arrangement, internally pop-up fan mechanism arrangement, screen structure arrangement, that employs the use of EMI / RFI material properties which will provide shielding or blockage (either reflective or absorptive or dissipative behavior in nature or some interdependency combinations of said behavior group) of harmful direct line-of-sight electromagnetic field radiation from an emanating antenna wireless transmit / receive electronic equipment source. This device is placed in relatively close-proximity with or without contact to the sensitive human body tissue part and lies in the direct line-of-sight to the emanating antenna electromagnetic field radiation or propagation field path of travel. Additional objects, advantages, and features of the present invention will become apparent from the

following description and appended claims, taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure A is a simplified circuit model comparison between a closed-form versus opened-form method design solutions as applied to close-proximity electromagnetic field radiation exposure to the user;

Figure 1 is a perspective view of such wearable garment device such as a baseball cap with having EMI / RFI material properties, providing local area shielding or blockage from close-proximity wireless transmit / receive electronic equipment according to an embodiment of the present invention;

Figure 2 is a perspective view of such wearable garment device in Figure 1 depicting a modified implementation of the embodiment as worn differently by the user to provide a variation in shielding coverage area;

Figure 3 is a perspective view of such electronic equipment carrying pouch of extended upwardly fan structure arrangement device with having EMI / RFI material properties providing various applications to shielding sensitive human body tissue part, according to an embodiment of the present invention;

Figure 4 is a perspective view of such foldable or fixed fan device structure arrangement with having EMI / RFI material properties providing various applications to shielding sensitive human body tissue part, according to an embodiment of the present invention;

Figure 5 is a perspective view of such internally pop-up foldable fan device structure arrangement with having EMI / RFI material properties providing various

applications to shielding sensitive human body tissue part, according to an embodiment of the present invention;

Figure 6 is a perspective view of such sandwiched type screen device arrangement with having EMI / RFI material properties providing various applications to shielding a sensitive human body tissue part, according to an embodiment of the present invention;

Figure 7 is a perspective view in variation of such sandwiched type screen device similar to Figure 6 as located differently with the wireless transmit / receive electronic equipment by the user to provide a variation in shielding area according to an embodiment of the present invention;

Figure 8 is a perspective view of such screen or blind-screen device with having EMI / RFI material properties providing various applications to shielding sensitive human body tissue part, according to an embodiment of the present invention;

Figure 9 is a perspective view of such eye-glass device with having EMI / RFI material properties providing various applications to shielding sensitive human body tissue part, according to an embodiment of the present invention;

Figure 10 is a perspective view of the " Cell-Shield Wearable " logo according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

By way of opened-form method design solutions, the following discussion of the preferred embodiments directed to wearable garments including and not limited to a hat as a baseball cap, eyewear articles including and not limited to an eye-glass,

electronic equipment carrying pouch of extended upwardly fan structure arrangement, foldable or fixed fan structure arrangement, internally pop-up fan mechanism arrangement, screen articles, wearable wrap-around type articles, where said items joined with having EMI / RFI material properties that is predeterminedly worn by the user or placed between the user and the electromagnetic field emanating wireless transmit / receive electronic equipment 20 as comprised of an electronic body 21 and antenna 22, serves to provide predetermined local human body tissue part area with electromagnetic field shielding or blockage , either reflective or absorptive or dissipative behavior in nature or some interdependency combinations of said behavior group, from exposure to direct line-of-sight electromagnetic field signal radiating from a wireless transmit / receive electronic equipment antenna 22 is merely exemplary in nature and is in no way intended to limit the invention or its applications or uses. It is further noted that in all following antenna 22 discussions, although the drawings shown are in external electronic body antenna structure design form representation, an internally embedded electronic body antenna structure design form in meaning is encompassed in this embodiment.

Referring to Figures 1 through 9 are perspective views of such wearable garment device types, electronic equipment carrying pouch of upwardly fan structure arrangement, fan structure arrangement, eyewear articles and screen article types, joined with having EMI / RFI material properties for which the invention is located between the sensitive human body tissue part area and the direct line-of-sight electromagnetic field radiation emanating from a wireless transmit / receive electronic equipment antenna 22. Electromagnetic field radiation emanating from a wireless transmits / receive electronic equipment antenna 22 when located in close-proximity to a user human body tissue part will propagate a portion of its energy through the

human body tissue non-blocked. The nature of this invention provides the affected local human body tissue part area with predetermined electromagnetic field shielding or blockage effective area zone of protection from exposure to direct line-of-sight electromagnetic fields. These electromagnetic fields propagates in a path of travel that originates from an antenna 22 which emanates a composite of electromagnetic fields traveling in a radial isotropic direction and those of the direct line-of-sight electromagnetic fields towards the sensitive human body tissue part. A predetermined portion of the electromagnetic fields are then blocked by the invention shielding effective area zone and thereby leaving the outside region of the shielding effective area zone comprising the remaining non-blocked electromagnetic field radiation to be un-perturbed for normal equipment signal transmission operation.

In close-proximity electromagnetic field radiation exposure to the user, the invention variation of Figure 1 is a perspective view of such wearable garment device type joined with having EMI / RFI material properties that is worn on the user head 40, in particular but not limited to any hat design, a baseball cap 10 design to provide local head shielding or blockage effective area 15 from exposure to direct line-of-sight electromagnetic field radiation 51, 53 emanating from a wireless transmit /receive electronic equipment antenna 22. In addition, in Figure 2 the user may wear the baseball cap 10 design in a different orientation over the head that will provide various shielding coverage, local head blockage effective area 16 from exposure to direct line-of-sight electromagnetic field radiation 55 to the head with respect to the wireless transmit / receive electronic equipment antenna 22 position.

As shown in Figures 1 and 2 according to the invention, potential harmful direct line-of-sight electromagnetic field radiation 51, 53, 55 are shielded or blocked as reflective or absorptive or dissipative behavior in nature or some interdependency

combination of said behavior group, from propagating through the invention and through the sensitive human body tissue part area directly behind or beneath the invention.

Note in general description applied to Figures 1 to 9, the diagrammed legend 39 describes a pictorial representation of the electromagnetic field radiation travel pattern as representative sample-point lines of directional travel path and are depicted as interconnecting lines with arrows for examples of deflected or blocked electromagnetic field radiation travel patterns 51 to 52, 53 to 54, 55 to 56, 57 to 58, 59 to 60, 61 to 62, 63 to 64, 65 to 66, 67 to 68 as influenced by the functional behavior of the invention local shielding effective area and the other lines with tick marks and arrows are shown for examples of non-blocked electromagnetic field radiation travel patterns 30, 31, 32, 33, 34, 35, 36, 37, 38 as is not designed to be shielded or blocked by the invention. With respect to Figures 1 and 2, examples of shielded or blocked electromagnetic fields 51 to 52, 53 to 54, 55 to 56 and non-blocked electromagnetic fields 30, 31, 32, 33 are shown to demonstrate the inventions shielding or blocking functional nature. Also note, in general, a typical wearable garment radiation shield material cross-sectional view 11 of the invention is shown, and is not limited in basic design form implementation to be employed with other wearable garments including and not limited to hats, electronic equipment carrying pouch of extended upwardly fan structure arrangement, foldable or fixed fan structure arrangement, internally pop-up fan mechanism arrangement, eyewear articles as an eye-glass, screens, blind-screen, wearable wrap-around type articles, is a baseball cap 10 device material cross-sectional perspective, joined with EMI / RFI material properties.

The general device material cross-sectional view 11 perspective of the invention joined with having EMI / RFI material properties layered together in a

predetermined about or multitude of alternating sandwiched material layer fashion such as and not limited to: an outside EMI / RFI material layer 12 option, an optional cloth or other support material layer 13 and an inside EMI / RFI material layer 14 option.

Also note in Figures 1 and 2 that the head shielding effective area 15, 16 perspectively is designed to encompass around the user head 40 and not around the antenna 22, thus the invention design constituting an opened-form method design solutions.

In another example of close-proximity electromagnetic field radiation exposure to the user, the invention variation of Figure 3 is a back, side and front perspective view of such electronic equipment carrying pouch of extended upwardly fan structure arrangement device 110 joined with having EMI / RFI material properties, with electronic equipment access window holes 124, 125, 126 as required, that is hand-held by the user, near the head 41, 42, perspectively. The wireless transmit / receive electronic equipment 20, in particular but not limited to a cellular telephone, a cellular telephone predeterminedly placed inside the electronic equipment carrying pouch of extended upwardly fan structure arrangement 110 to provide electromagnetic field local head shielding or blockage effective area 120 from exposure to direct line-of-sight electromagnetic field radiation 57 to 58, 59 to 60 emanating from a wireless transmit / receive electronic equipment antenna 22 position. The remaining non-blocked electromagnetic field radiation 34, 36 are left un-perturbed by the invention design. Further note that the head shielding effective area 120 is designed to relatively encompass around the head 41,42 perspectively and not around the antenna 22, thus the invention design constituting an opened-form method design solutions.

Likewise, in another example of a close-proximity electromagnetic field radiation exposure to the user, the invention variation of Figure 4 is a back, front and side perspective view of such foldable or fixed fan device structure arrangement 210, joined with having EMI / RFI material properties and said fan device structure arrangement 210 that implements a clipped-on or slip-fitted on attachment arrangement 220. The wireless transmit / receive electronic equipment 20, predeterminedly attached to the clipped-on or slip-fitted on attachment arrangement 220 will provide electromagnetic field local head blockage effective area 121 from exposure to direct line-of-sight electromagnetic field radiation 57 t 58, 59 to 60 emanating from a wireless transmit / receive electronic equipment antenna 22 position. The non-blocked electromagnetic field radiation 34, 35 are left un-perturbed by invention design. Or as shown in another variation of the invention, in Figure 5 an internally pop-up fan mechanism arrangement 250 within the user wireless transmit / receive electronic equipment antenna body 23, comprising a slide position mechanism 24 within a slide assembly 26 and thereby mechanically supports the fan device pop-up mechanism structure arrangement 250 joined with EMI / RFI material properties. Again further note that the local head blockage effective area 121 and 127 respectively, is designed to relatively encompass around the user head and not around the antenna 22, thus the invention design constituting an opened-form method design solutions.

Continuing another example of a close-proximity electromagnetic field radiation exposure to the user, the invention variation of Figure 6 is a front and side perspective view of such sandwiched type screen device arrangement 310 joined with EMI / RFI material properties, or modified slotted sandwiched type screen device arrangement 311 joined with EMI / RFI material properties, that is either slipped-in

arrangement between the wireless transmit / receive electronic equipment 20, a belt arrangement 29 and the user body part 43,45 perspectively for device arrangement 310, or is slip-fitted onto the wireless transmit / receive electronic equipment body hanger 23 which is then sandwiched closely against the user body 44 and hung in support by a belt arrangement 29 for device arrangement 311. Electromagnetic field user body part shielding or blockage effective area 122 is provided by either approach through sandwiched type screen device arrangement 310 or 311 from exposure to direct line-of-sight electromagnetic field radiation 57 to 58, 59 to 60 emanating from a wireless transmit receive electronic equipment antenna 22 position. The non-blocked electromagnetic field radiation 34, 35, 36 perspectively, are left un-perturbed by the invention design. Note that the user body part shielding effective area 122 is designed to relatively encompass around the user body part 43, 44, 45 perspectively and not around the antenna 22, thus the invention design constituting an opened-form method design solutions.

In contrast, note that preceding invention variations discussions were examples of close-proximity electromagnetic field radiation exposure to the user. But for Figure 7, this invention variation applies to relative far-field proximity electromagnetic field radiation exposure to the user in providing effective shielding. This invention variation of Figure 7 is a front and side perspective view of such variation of sandwiched type screen device 410 joined with EMI / RFI material properties that is slipped-in arrangement between the wireless transmit / receive electronic equipment antenna 22 and computer device 90 in direct line-of-sight of the human body head sensitive tissue part 46, 47, perspectively. The sandwiched type screen device 410 is predeterminedly placed between the wireless transmit / receive electronic equipment 20, in particular but not limited to a cellular telephone, the back or front side view of

the computer device 90, as to provide electromagnetic field local head shielding or blockage effective area 123 from exposure to direct line-of-sight electromagnetic field radiation 57 to 58, 59 to 60, emanating from a wireless transmit / receive electronic equipment antenna 22 position. The non-blocked electromagnetic field radiation 34, 35 are left un-perturbed by the invention design. Note that the local head shielding effective area 123 is designed to relatively encompass around the user head 46, 47 perspectively and not around the antenna 22, thus the invention design constituting an opened-form method design solutions.

For another invention variation in far-field proximity electromagnetic field radiation exposure to the user as shown in Figure 8 is a perspective view of such screen or blind-screen device joined with EMI / RFI material properties of predetermined size that is either free-standing screen 510 or suspended screen 550 from a support structure and is predeterminedly placed between the wireless transmit / receive electronic equipment antenna 22 and the user human body 48, 49, perspectively. Shielding is provided by the electromagnetic field shielding effective area 524, 525 perspectively, for the human body from exposure to direct line-of-sight electromagnetic field radiation 61 to 62, 63 to 64 and 65 to 66, 67 to 68 perspectively emanating from a wireless transmit /receive electronic equipment antenna 22 position. The non-blocked electromagnetic field radiation 34, 35 are left un-perturbed by the invention design. Note that the user body shielding effective area 524, 525 perspectively is designed to relatively encompass around the user body 48, 49 perspectively and not around the antenna 22, thus the invention design constituting an opened-form method design solutions.

In another example of far-field proximity electromagnetic field radiation exposure to the user, the invention variation of Figure 9 is a front and back

perspective view of such eye-glass device 610 joined with having EMI / RFI material properties that is permanently or non-permanently attached that will provide local eye shielding or blockage effective area 627 from exposure to direct line-of-sight electromagnetic field radiation 69 to 70, 71 to 72 emanating from a wireless transmit / receive electronic equipment antenna 22. The non-blocked electromagnetic field radiation 37, 38 are left un-perturbed by the invention design. The wireless transmit / receive electronic equipment in this case and not limited to function, may represent visual information content, such that the user human body head 49, 149 shown perspectively may expose sensitive human body tissue eye part to potential harmful direct line-of-sight electromagnetic fields. Note that the local eye shielding effective area 627 is designed to relatively encompass around the human body head 49, 149 perspectively and not around the antenna 22, thus the invention design constituting an opened-form method design solutions.

Figure 10 is a perspective view of the " Cell-Shield Wearables " logo 700 encompassing an overall 1 to 1 aspect ratio design area and simple general logo design dimensions according to the embodiment of the present invention.

The discussion above describes wearable garments, electronic equipment carrying pouch, fan structures, eyewear articles and screen articles, joined with EMI / RFI material properties that include several variations to allow it operated as an electromagnetic field radiation shielding or blockage device for the predetermined human body tissue part, either predeterminedly worn or placed in close proximity to the user. Although various implementations and variations are discussed above, other variations can be incorporated within the scope of the present invention, as would be appreciated by those skilled in the art. The foregoing discussion discloses and describes merely exemplary embodiments of the present invention. One skilled in the

art will readily recognize from such discussion, and from the accompanying drawings and claims, that various changes, modifications and variations can be made therein without departing from the spirit and scope of the invention as defined in the following claims.

Claims:

1. A method of shielding electromagnetic fields 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71 from direct line-of-sight antenna signal radiation of an wireless transmit / receive electronic equipment antenna 22 such as and not limited to a cellular telephone antenna, comprises the use of:

Joining wearable garments including and not limited to types of hats, such as a baseball cap 10 with electromagnetic interference / radio frequency interference (EMI / RFI) material properties to form hybrid wearable garment devices, Joining various design types of screens 310, 510, 550 with EMI / RFI material properties to form types of hybrid screen devices,

Joining eyewear articles including and not limited to an eyeglass 610 with EMI /RFI material properties to form types of hybrid eyewear article devices,

Joining wearable wrap-around type articles including and not limited to a bandanna or to a scarf with EMI / RFI material properties to form hybrid wearable wrap-around type article devices,

Joining electronic equipment carrying pouch 110 of extended upwardly fan structure arrangement with EMI / RFI material properties to form hybrid electronic equipment carrying pouch of extended upwardly fan structure arrangement devices,

Joining foldable or fixed fan structure arrangement 210, 410 with EMI / RFI material properties to form hybrid foldable or fixed fan structure arrangement devices,

Joining an internally pop-up fan mechanism arrangement 250 with EMI / RFI material properties to form hybrid internally pop-up fan arrangement devices,

Whereby said devices are specifically worn or placed between the wireless transmit / receive electronic equipment antenna 22 and the sensitive human body tissue part to provide means for effective electromagnetic field shielding or blockage, either reflective or absorptive or dissipative behavior in nature or some interdependency combinations of said behavior group, from potentially harmful direct line-of-sight of electromagnetic fields 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71 emanating from a wireless transmit / receive electronic equipment antenna 22, as solutions for opened-form design method which serves to minimize the shielding degradation effects and sensitivity interaction effects on normal non-blocked electromagnetic fields 30, 31, 32, 33, 34, 35, 36, 37, 38 antenna signal transmission operation.

2. A method of shielding electromagnetic fields 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71 emanating from wearable electronic hardware equipment with wireless transmit / receive electronic equipment capability, according to claim 1,

Whereby said devices are specifically worn between the wearable electronic hardware equipment wireless antenna 22 area and the sensitive human body tissue part area to provide means for predetermined local human body tissue area shielding of electromagnetic fields emanating from various types of wearable electronic equipments.

3. An electromagnetic field shielding or blockage device according to claim 1 comprises of:

a plurality of EMI / RFI materials, processes and forms used to operate specifically within the 100 Mega-Hertz to 300 Giga-Hertz electromagnetic field frequency spectrum range parameter,

a plurality of EMI / RFI materials and processes used comprising and not limited to: conductive composites, conductive laminates, conductive fibers, molded / extruded conductive elastomers, conductive silicone-base, conductive polymer-base, woven fabric, foam, conductive coatings, foil, tape, film shielding laminates, conductive film can be Indium Tin Oxide (ITO) or multi-layer conductive coatings, conductive material deposition process, silk screen on conductive paint, metal mesh, knitted wire mesh, grilles, which constitute electrical properties having a predetermined resistivity range and is within about zero ohms per square and less than or equal to 100,000 ohms per square range parameter,

a plurality of EMI / RFI materials used comprising of types of forms such as and not limited to: conductive woven fabric, metal or polymer-based or silicone-based mesh, knitted wire mesh, grilles, of said types of forms having a multitude array of square holes in sheet-material form of predetermined thickness, where said forms design comprises a grid structure arrangement of square holes, the overall effective square hole area design range is within about zero to **0.01** $inch^2$ in grid area effective square hole dimensions, which constitute electrical properties having predetermined electromagnetic waveguide cutoff wavelength range parameter behavior in nature,

a plurality of EMI / RFI materials used comprising of types of material textures such as and not limited to: flat surface shape, periodic triangular-surface or accordion surface shape, periodic grid of pyramidal volume protruding element surface shape, periodic grid of semi-bubble volume protruding-in or protruding-out element surface shape, periodic grid of waffle-iron shape protruding-out or protruding-in element surface shape, which constitute the enhancement of increasing electromagnetic field surface absorption range parameter behavior in nature,

whereby said electrical design range parameters contain means for effective electromagnetic field shielding or blockage by the invention and serves to minimize the shielding degradation effects and sensitivity interaction effects on non-blocked electromagnetic field 30, 31, 32, 33, 34, 35, 36, 37, 38 normal antenna signal transmission operation.

4. An electromagnetic field shielding or blockage device according to claim 1, where said electromagnetic shielding device comprising:

a plurality of conventional fabrication techniques used to produce wearable garments including a hat such as and not limited to a baseball cap 10,

a plurality of conventional fabrication techniques used to produce wearable wrap-around type articles including and not limited to a bandanna or scarf,

a plurality of conventional fabrication techniques used to produce a electronic equipment carrying pouch 110 of extended upwardly fan structure arrangement,

a plurality of conventional fabrication techniques used to produce eyewear articles including and not limited to an eye-glass 610,

a plurality of conventional fabrication techniques used to produce attachable fan structure arrangement 210, 410 with fixed or foldable or collapsible functions,

a plurality of conventional fabrication techniques used to produce internal electronic equipment pop-up fan mechanism arrangement 250 with fixed or foldable or collapsible functions,

a plurality of conventional fabrication techniques used to produce free-standing 510 or suspended support screen 550 structures including and not limited to blinds with fixed or foldable or collapsible functions,

where said conventional fabrication techniques joined specifically with EMI / RFI material properties to form hybrid fabrication constructions and process forms of the electromagnetic field shielding device, comprises of and not limited to:

an EMI / RFI material layer or liner joined in a predetermined about or multitude of alternating sandwich layered fashion 11 with a predetermined wearable garment layer or support member structure layer or screen structure layer where said sandwich layers could be sewn on together, or adhesively attached or a wrapped around configuration or a temporary attachment by way of clip-on pins or pinned on attach or Velcro-attached or non-permanent bond adhesive attach or process depositioned attach together, to form together a predetermined sandwiched layer arrangement,

or an EMI / RFI material layer joined with predetermined about or multitude layers of a predetermined wearable garment layer or support member layer or screen structure layer to form together a

predetermined laminate arrangement, or a some about or multitude combination of predetermined EMI / RFI material types and layers used entirely in place of the wearable garment layer or the support member structure layer or the screen structure layer To form together a predetermined hybrid material and process arrangement,
whereby said conventional fabrication techniques, said predetermined sandwiched layer arrangement 11, said predetermined laminate arrangement, said predetermined hybrid material and process arrangement, provide predetermined methods of hybrid wearable garment fabrication construction techniques, hybrid eyewear article fabrication construction techniques, hybrid fan structure fabrication construction techniques, hybrid pop-up fan mechanism fabrication construction techniques, and hybrid screen structure fabrication construction techniques for the invention.

5. A method of device rating the shielding or blockage effectiveness of reducing the energy of radiated electromagnetic fields 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71 is referred to as radiation blockage factor (RBF) comprising of:
the standard unit of RBF measurement is the decibel or dB,
the decibel value is the ratio of two measurements of electromagnetic field ratio of two measurement of electromagnetic field strength taken before and after shielding is in place, the method by which RBF may be estimated is the transmission line method and circuit method (IEEE, 1988, "Special issue on electromagnetic shielding", IEEE Transactions on EMC, EMC-30, No. 3, August), an alternate standard unit of RBF measurement is in magnitude ratio

defined as M_{RBF} = 10^(RBF/20), alternate nomenclatures for RBF device rating the shielding effectiveness, are radiation proof factor (RPF) and radiation shield factor (RSF), an alternate standard unit of RPF measurement is in magnitude ratio defined as M_{RPF} = 10^(RPF/20), and an alternate standard unit of RSF measurement is in magnitude ratio defined as M_{RSF} = 10^(RSF/20), whereby said device rating provide a quality figure-of-merit measure for the invention.

6. A method of product awareness for the hybrid wearable garments 10, hybrid wearable wrap-around type articles, hybrid screens 310, 510, 550, hybrid fan structure arrangements 210, 250, 410, hybrid carrying pouch arrangements 110, and hybrid eyewear articles 610 as a means for their electromagnetic field shielding property from direct line-of-sight antenna 22 signal transmission of a wireless transmit / receive electronic equipment 20, is comprised of:
the trademark name, " Cell-Shield Wearables ", the combination of colors, orange and yellow , used in print for the " Cell-Shield Wearables " name and logo, the logo for the " Cell-Shield Wearables " trademark name as shown in Figure 10, whereby said product awareness items provide a quality name brand recognition for reliability and dependability from the invention.

7. A method of shielding electromagnetic fields 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71 according to claim 1 embodies both externally mounted electronic body antenna 22 and internally embedded electronic body antenna structure design types.

8. A method of predetermined effective shielding area coverage protection according to claim 1 comprising:

an increasing or decreasing elongated invention structure to encompass around the user body part in a predetermined set of dimensions of length, width, height or thickness of the embodiments of the shield device invention variations, whereby said predetermined effective shielding area coverage provide means of predetermined compliance in meeting the user's required electromagnetic field shielding or blocking performance.

9. Another method of alternate device rating the shielding or blockage effectiveness of reducing the energy of a radiated electromagnetic field 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71 according to claim 5 as other alternate nomenclatures to mean equivalently RBF nomenclature in nature, includes: electromagnetic-field blockage factor (EBF), electromagnetic-field proof factor (EPF), electromagnetic-field shield factor (ESF), cell-phone blockage factor (CBF), cell-phone proof factor (CPF), cell-phone shield factor (CSF), whereby said alternate device ratings provide a terminology extension of shield effectiveness rating nomenclature means to provide a relevant quality figure-of-merit measure for the invention.

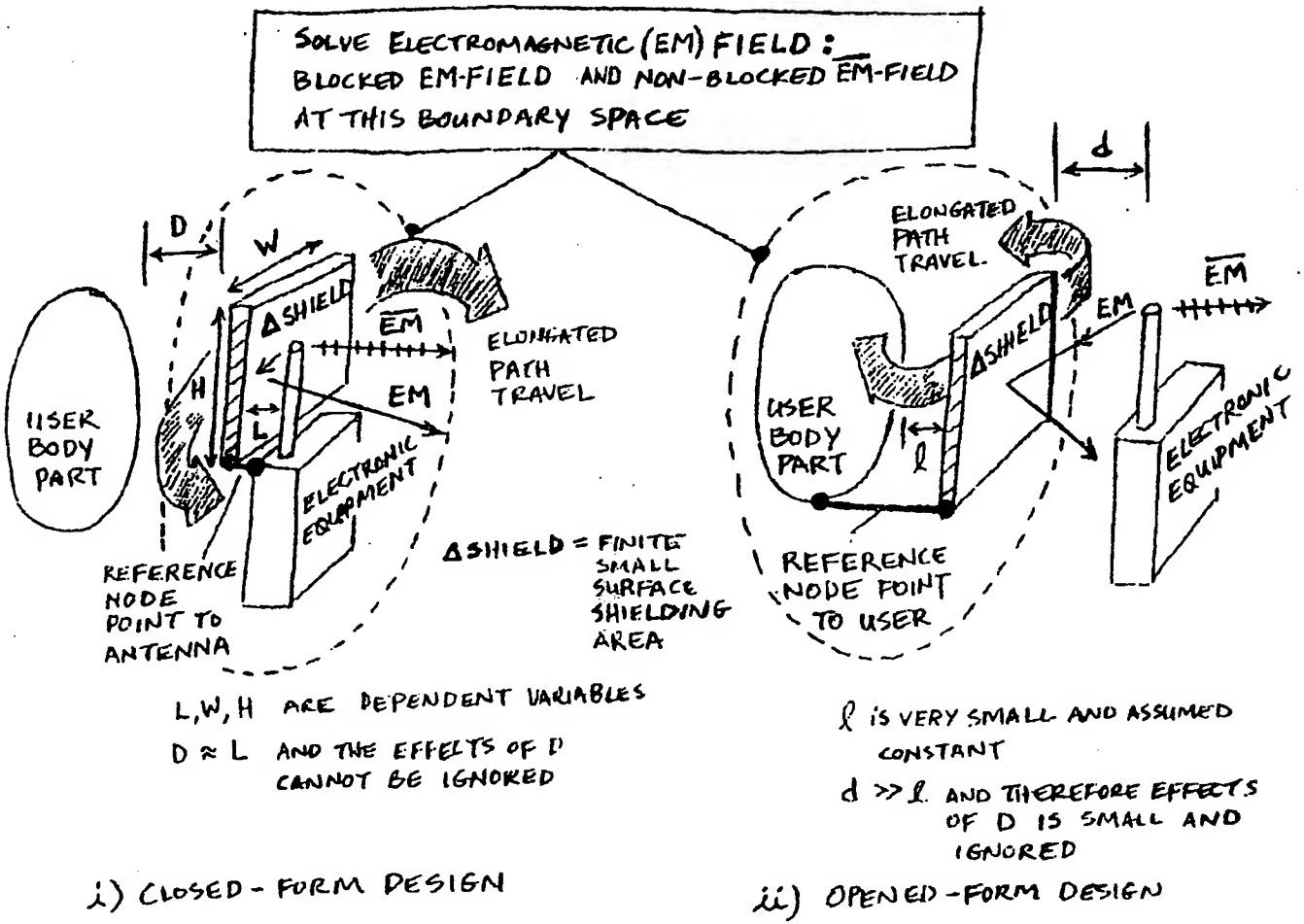


FIGURE A. SIMPLIFIED CIRCUIT MODEL COMPARISON BETWEEN CLOSED-FORM DESIGN VERSUS OPENED-FORMED METHOD DESIGN SOLUTIONS.

FIGURE 1

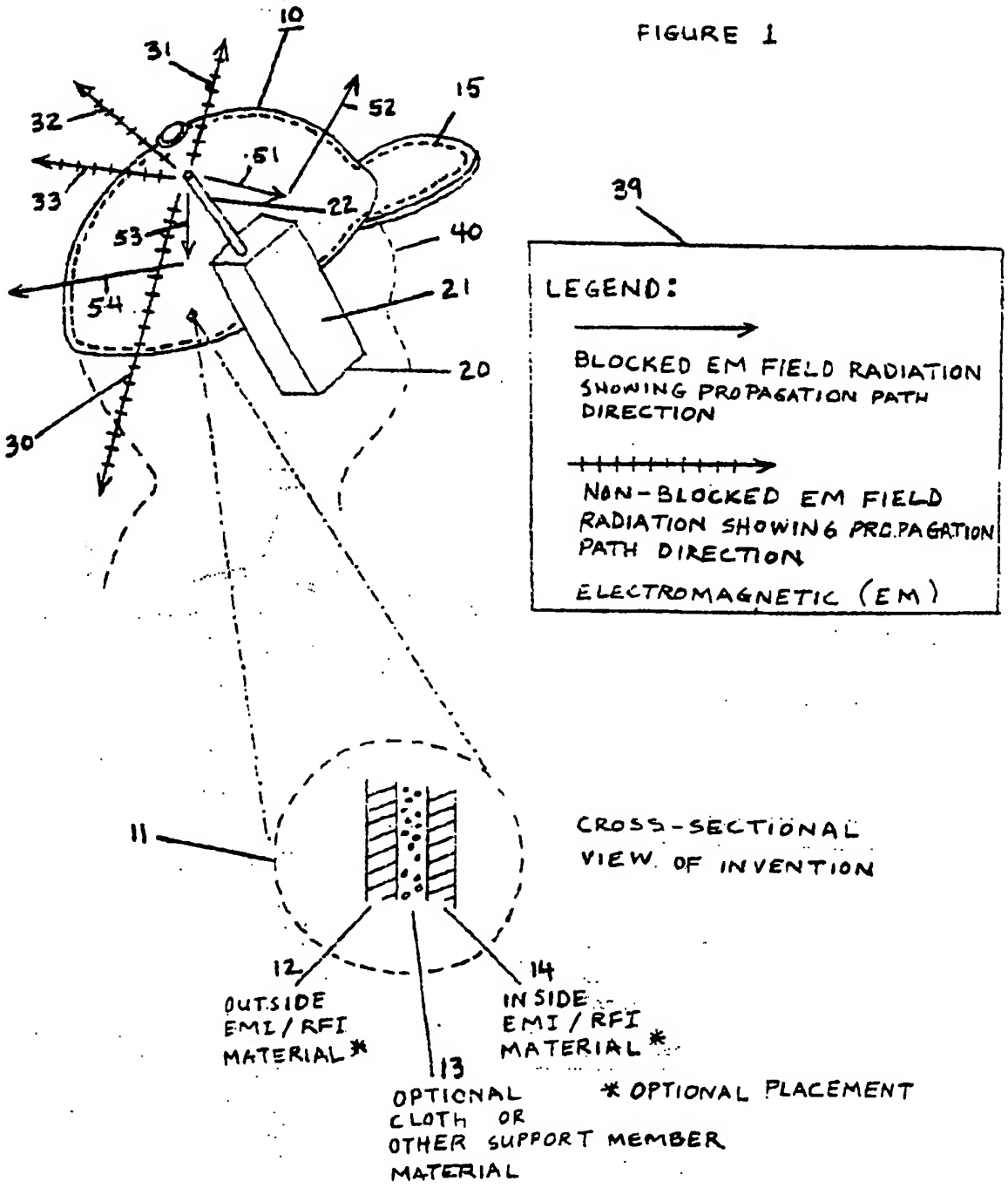
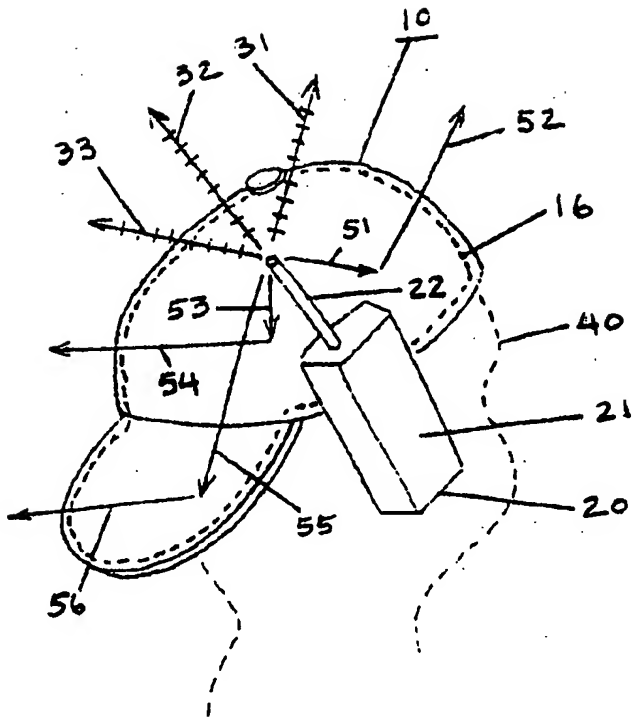

10
31
32
33
52
15
51
22
53
40
21
54
20
30
39
LEGEND:
BLOCKED EM FIELD RADIATION SHOWING PROPAGATION PATH DIRECTION
NON-BLOCKED EM FIELD RADIATION SHOWING PROPAGATION PATH DIRECTION
ELECTROMAGNETIC (EM)
11
CROSS-SECTIONAL VIEW OF INVENTION
12
OUTSIDE EMI/RFI MATERIAL *
14
INSIDE EMI/RFI MATERIAL *
13
OPTIONAL CLOTH OR OTHER SUPPORT MEMBER MATERIAL
* OPTIONAL PLACEMENT

FIGURE 2



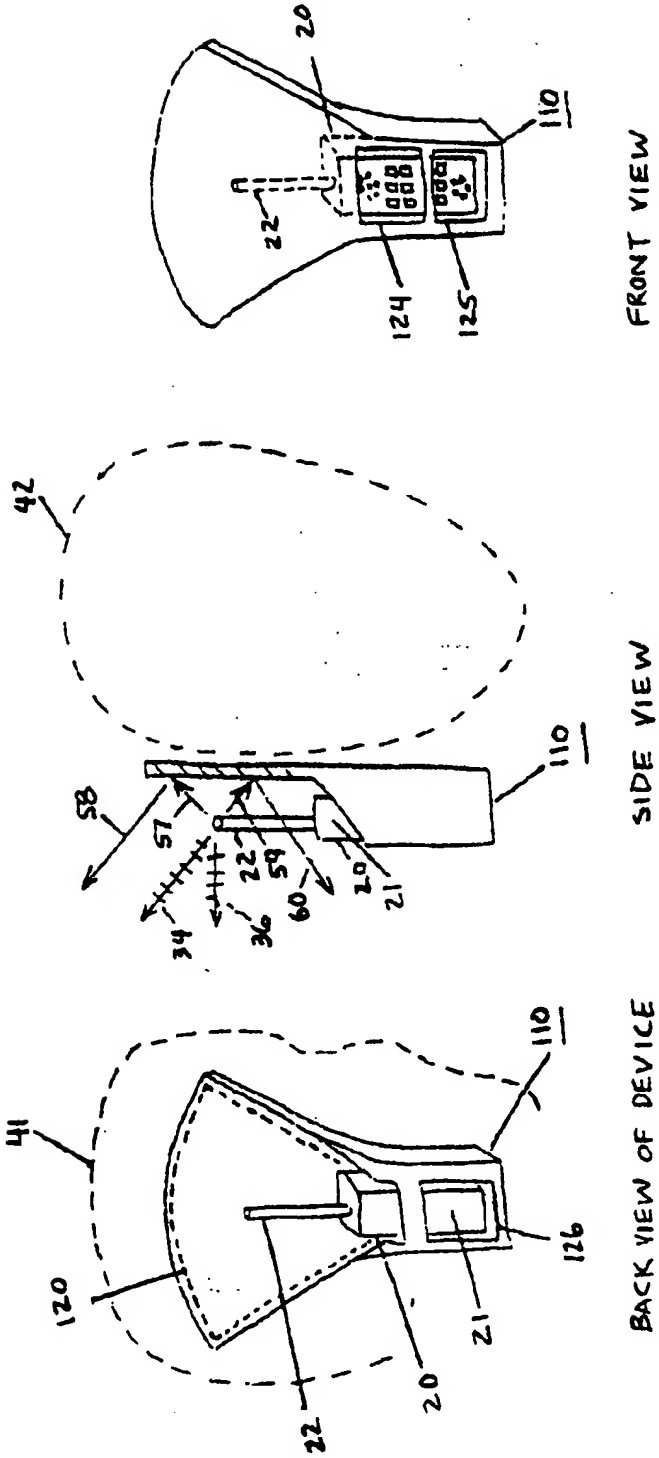

20
110
22
124
125
FRONT VIEW
42
110
58
57
22
59
60
20
21
34
36
SIDE VIEW
41
110
120
126
21
22
20
BACK VIEW OF DEVICE

FIGURE 3

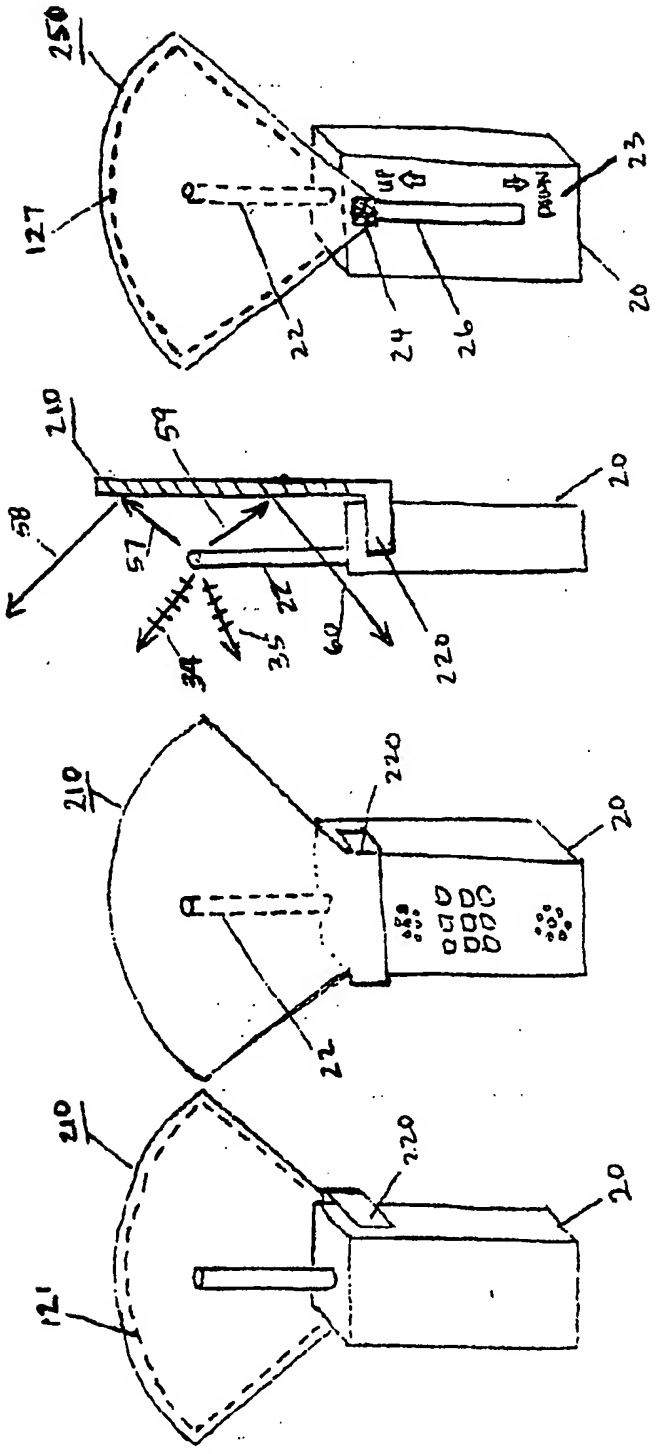


FIGURE 4

FIGURE 5

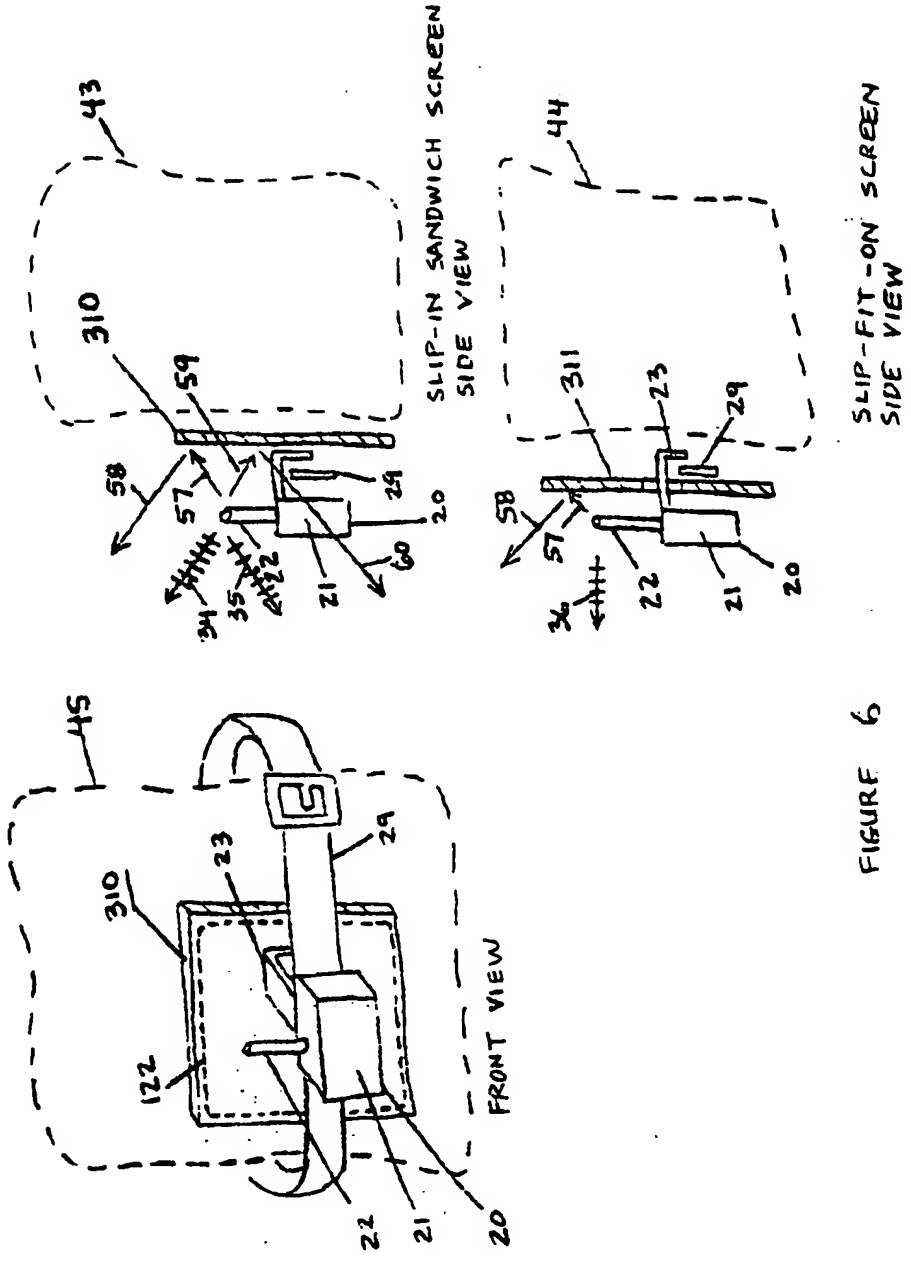

43
310
59
58
57
29
20
34
35
22
21
60
SLIP-IN SANDWICH SCREEN
SIDE VIEW
44
311
23
29
58
57
30
22
21
20
SLIP-FIT-ON SCREEN
SIDE VIEW
45
310
23
29
122
22
21
20
FRONT VIEW

FIGURE 6

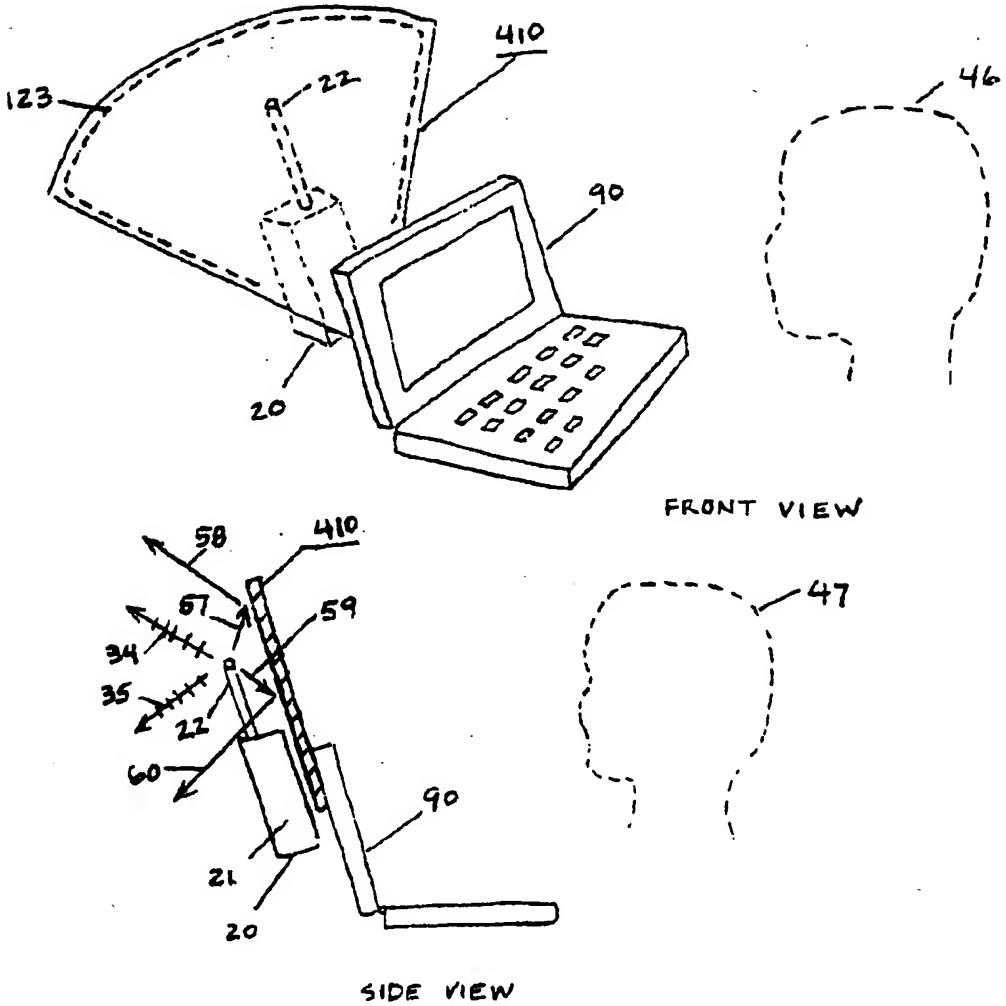

123
410
22
90
20
46
FRONT VIEW
58
410
67
59
34
35
22
60
90
21
20
47
SIDE VIEW

FIGURE 7

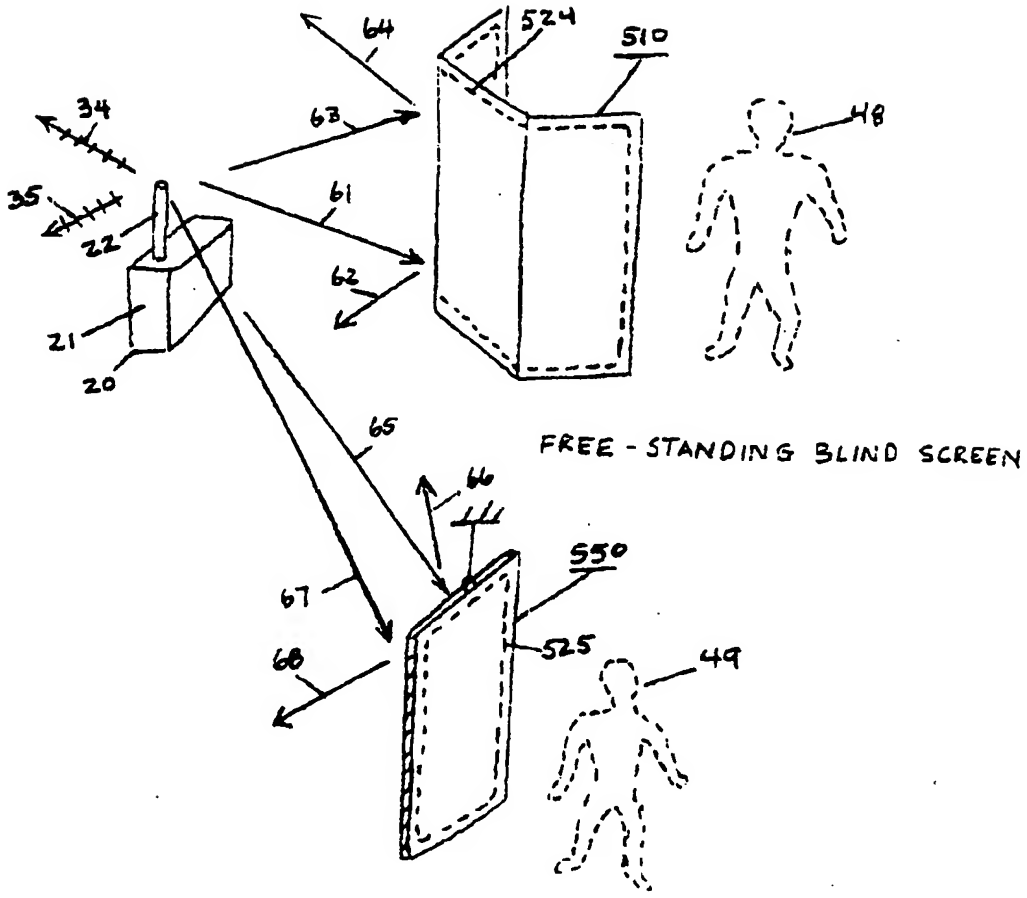

64
524
510
34
63
48
35
61
22
62
21
20
65
FREE - STANDING BLIND SCREEN
66
550
67
525
68
49
SUSPENDED BLIND SCREEN

FIGURE 8

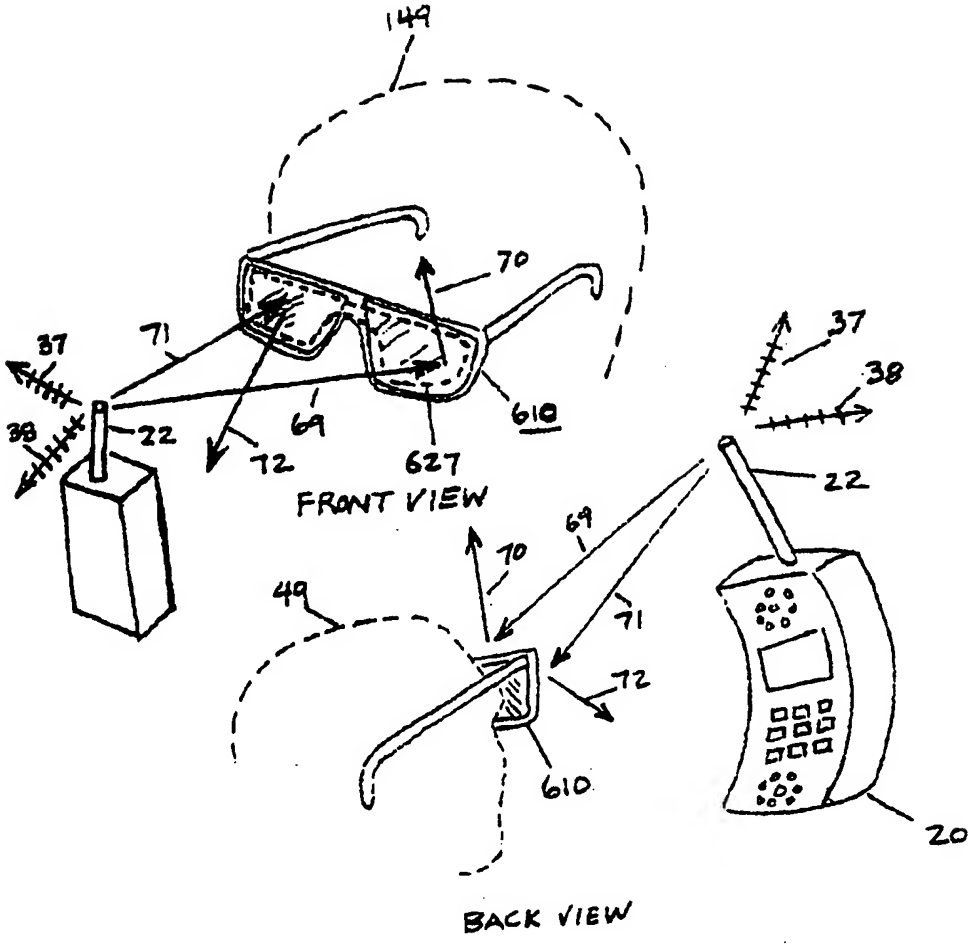

149
70
71
37
38
22
69
72
627
610
FRONT VIEW
37
38
22
69
70
71
49
72
610
20
BACK VIEW

FIGURE 9

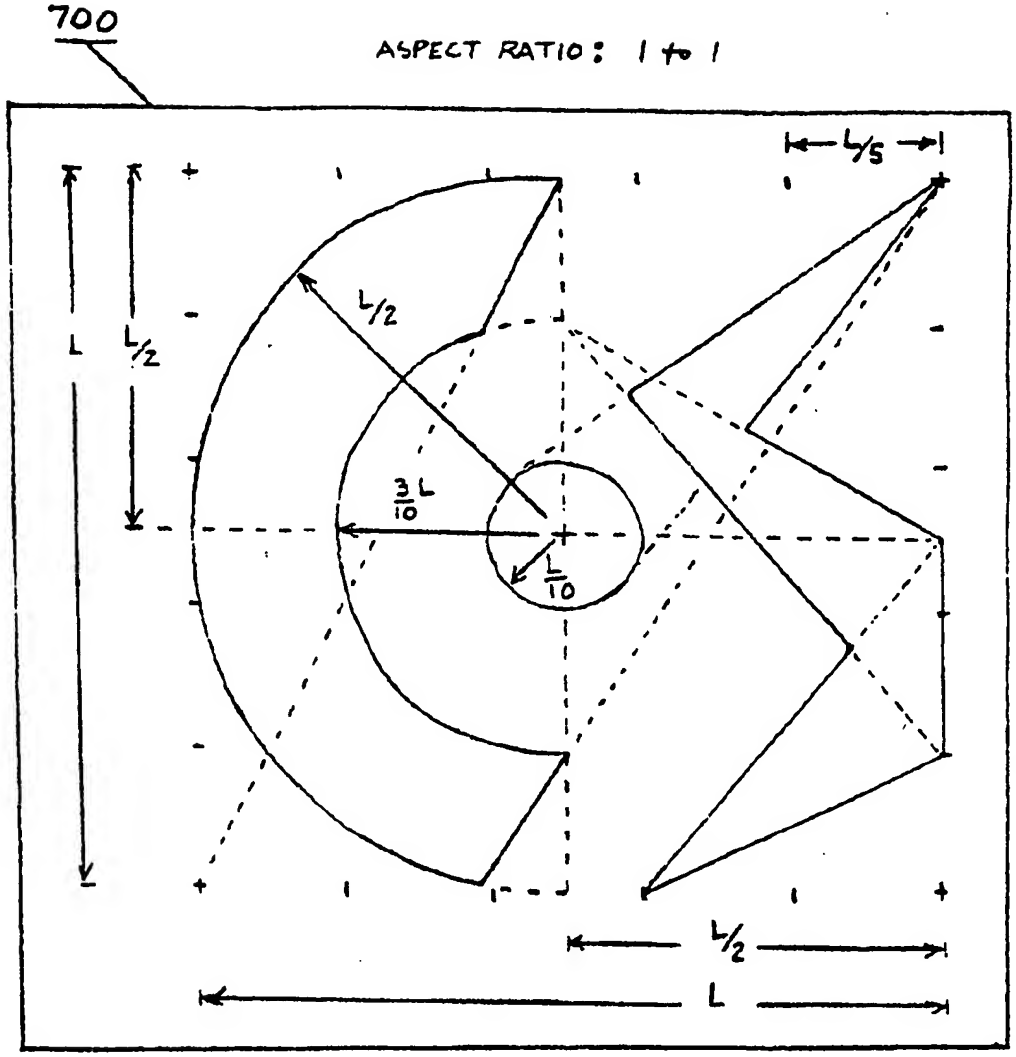


FIGURE 10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/40315

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :H04B 1/38
US CL :455/90, 129, 575

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 455/90, 129, 575, 128, 117, 351, 300; 379/437, 451-452, 428, 430, 433, 447, 440; 343/841, 702, 718; 250/515.1; 174/35R; 2/171

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,570,476 A (OLIVE) 05 NOVEMBER 1996, column 1, lines 40-40, column 2 lines 39-42, figure 1.	1-9

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
21 OCTOBER 2000

Date of mailing of the international search report
20 NOV 2000

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